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Research report

Factors influencing the frequency of children's consumption of soft drinks ☆

Simone Pettigrew [a,*], Michelle Jongenelis [a], Kathy Chapman [b], Caroline Miller [c,d]

[a] School of Psychology and Speech Pathology, Curtin University, Kent St, Bentley, Western Australia 6102, Australia
[b] Cancer Council NSW, 153 Dowling Street, Woolloomooloo, NSW, Australia
[c] South Australian Health & Medical Research Institute, PO Box 11060, Adelaide, South Australia 5001, Australia
[d] University of Adelaide, Adelaide, South Australia 5001, Australia

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ABSTRACT

Among other focus areas, interventions designed to improve children's diets need to address key factors contributing to children's consumption of sugar-sweetened beverages. The present study employed structural equation modelling to investigate the relationship between a broad range of predictor variables and the frequency with which Australian children consume soft drinks. In total, 1302 parents of children aged 8 to 14 years responded to an online survey about their children's food consumption behaviours. Soft drink consumption frequency was primarily influenced by parents' attitudes to soft drinks, children's pestering behaviours, and perceived social norms relating to children's consumption of these products. Importantly, pestering and social norms had significant direct effects on consumption frequency in addition to indirect effects via their impact on parents' attitudes to soft drink.

Introduction

Child obesity is a primary focus of obesity prevention interventions because of the potential benefits for both current and future cohorts. The risk of obesity in adulthood is higher for overweight children (Biro & Wien, 2010; Magarey, Daniels, Boulton, & Cockington, 2003), and encouraging healthy eating habits can be easier in childhood before taste preferences and habits consolidate (American Dietetic Association, 2004). While efforts to date appear to have had some effect on reducing the rate of increase in child obesity, prevalence rates remain at alarming levels and the search continues for effective methods of modifying relevant risk factors (Australian National Preventive Health Agency, 2014; World Health Organization [WHO], 2013).

As part of a larger study examining the factors that influence food preferences (blinded for review Pettigrew et al. 2013; 2015), the present study investigated the predictors of children's consumption of soft drinks. In the Australian context, soft drinks are defined as carbonated beverages (Moretto et al., 2014), and they are one product type within the broader category of sugar-sweetened beverages that also includes cordials, juices, sports drinks, and energy drinks (Hu, 2013; National Health and Medical Research Council (NHMRC), 2013). Sugar-sweetened beverages are in turn part of the larger group of unhealthy food products that are energy dense, nutrient poor (EDNP: Kant, 2000). There are mounting concerns relating to the particular contribution of sugar-sweetened beverages to child obesity (Gill, Rangan, & Webb, 2006; Grimes, Riddell, Campbell, & Nowson, 2013; Hu, 2013; Vartanian, Schwartz, & Brownell, 2007; WHO, 2015). Studies have found that sugar-sweetened beverage consumption is associated with a higher risk of weight gain and obesity (Martin-Calvo et al., 2014; Zheng, Allman-Farinelli, Heitmann, & Rangan, 2015; Zheng et al., 2014). In the specific case of soft drinks, Martin-Calvo et al. (2014) found daily consumption to be associated with a 69% relative increase in the risk of obesity. This growing evidence base is reflected in the recent inclusion of guidance to limit intake of these beverages in the Australian Dietary Guidelines (NHMRC, 2013).

Theoretical frameworks of the factors that are associated with children's diets and parents' child-feeding practices include a large number of variables, which range from individual parent attributes and behaviours through to environmental factors (Adamo & Brett, 2014; Davison & Birch, 2001; Faith et al., 2012; Golan, 2006; Golan & Weizman, 2001; Patrick & Nicklas, 2005; Pocock, Trivedi, Wills, Bunn, & Magnusson, 2010; Ventura & Birch, 2008). Individual attributes include parents' food-related knowledge and attitudes, socioeconomic status (SES), weight status (body mass index: BMI), and family structure. Parent behaviours include food preparation and consumption modelling, parenting style, and television viewing habits. Environmental factors include the available food supply, food-related government policies, food advertising, the cost of food

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* Corresponding author.
E-mail address: simone.pettigrew@curtin.edu.au (S. Pettigrew).

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products, and social norms relating to the consumption of unhealthy beverages. This diverse range of factors reflects the complex nature of food decisions and the difficulties associated with attempting to encourage behavioural change in this domain (Conner, 1993; Freeland-Graves & Nitzke, 2013).

The World Health Organization has recently noted the "need to evaluate different behavioural-change approaches to promote the reduction of free sugars intake; in particular, the intake of sugar-sweetened beverages" (WHO, 2015, p. 20). Intervention development requires a detailed understanding of the relative importance of influencing factors to enable prioritisation of those that have the most potential to improve outcomes (Swinburn et al., 2013). Given the strong socio-cultural role of food (Douglas & Isherwood, 1979), the relative weighting of different factors can vary between countries, necessitating formative research in specific national contexts. However, there are also likely to be similarities between countries that share cultural heritages and marketplace characteristics (e.g., the UK, the US, Canada, and Australia). The present study assessed the relative importance of different factors that influence children's consumption of soft drinks in the Australian context. Specifically, the pathways by which various individual and environmental factors impact on the reported frequency of children's consumption of soft drinks were estimated using structural equation modelling. The resulting model can facilitate the development of interventions that cater for the specific antecedents of consumption.

Method

Sample

The sample comprised 1302 parents of children aged 8 to 14 years. Data were collected from parents because of their critical roles in controlling the supply of food in the home and modelling food consumption behaviours to their children (Birch & Fisher, 1998; Brown & Ogden, 2004; Golan, 2006; Skouteris et al., 2012). The selected child age range reflects a period in which children's soft drink consumption increases dramatically (Australian Bureau of Statistics [ABS], 2014), and is similar to that used in other studies of parents' food-related attitudes and behaviours (Nansel et al., 2013; Pedersen, Grønhøj, & Thøgersen, 2015; Rawlins, Baker, Maynard, & Harding, 2013; Zarnowiecki, Dollman, & Parletta, 2014). In the Australian context, children in this age group tend to have suboptimal diets because they consume almost 40% of their daily energy from foods and beverages classified as 'discretionary foods' due to their high levels of sugar, fat, and/or salt (ABS, 2014).

The study received ethics approval from the University of Western Australia Human Research Ethics Committee. Respondents were recruited by a web panel provider (PureProfile) that has access to a large and diverse range of Australian adults. Potential respondents were emailed by the web panel provider to invite them to participate in the study, and other panel members could also nominate to participate by selecting the project from the lists of studies available on the provider's website. An initial screening process was used to check eligibility in terms of parent status. Reflecting the continuing dominance of women as primary caregivers (ABS, 2009), quotas were used to achieve a sample that comprising two-thirds mothers and one-third fathers. Those completing the survey received a small payment (AUD$2). Table 1 describes the resulting sample, which included parents of varying demographic profiles.

Table 1
Sample profile (n = 1302).

Respondent attributes		%	n
Gender	Female	67	868
	Male	33	434
Age	Under 40 years	41	535
	40+ years	59	767
Weight status (BMI)[a]	Underweight	3	30
	Healthy weight	44	440
	Overweight	31	314
	Obese	22	227
No. of children	1	29	378
	2	50	655
	3	18	230
	4+	3	39
Highest level of education	Incomplete schooling	3	42
	Year 10	10	128
	Year 12	17	223
	Technical qualification	28	369
	Undergraduate degree	25	319
	Postgraduate degree	17	221
Family structure	Single parent	13	168
	Two parents	79	1024
	Other	8	110

[a] Missing values not reported (n = 291).

Instrument

Web panel members from around the country who met the recruitment criteria (parents with at least one child aged 8 to 14 years) were sent an email inviting them to participate in the study. Alternatively, potential respondents could directly access the survey from the PureProfile web portal. Once they were identified as eligible, respondents answered a series of questions relating to their demographic characteristics (gender, age, residential postcode, income, education, family structure, and height and weight for BMI calculation) and the frequency with which their children consumed soft drinks (*Please indicate how often your children have soft drink*; 5-point scale ranging from never to daily). Children's consumption data were sought in the form of frequency estimates due to the difficulties experienced by consumers in estimating serving sizes (Young & Nestle, 1995) and the logistical problems associated with collecting food diary data in cross-sectional studies (Day, McKeown, Wong, Welch, & Bingham, 2001).

Respondents were also asked to indicate their attitudes to soft drinks (*In your opinion, soft drinks are not enjoyable/enjoyable, bad/good, inconvenient/convenient, waste of money/value for money*). Scores for each of these attributes were summed to generate a total attitude measure for each product category. Finally, respondents reported on a range of other variables including: amount of time spent watching television (*How many hours of TV do you usually watch each day on weekday/the weekend*: response options of none, up to 1 hour, up to 2 hours, up to 3 hours, up to 4 hours, up to 6 hours, up to 8 hours, TV is always on); the extent of pestering they experience from their children (*Please indicate how often your children ask you to buy treats, lollies, soft drink or fast food that they have seen advertised*; 5-point scale ranging from never to daily); and their perceptions of others' approval of the consumption of soft drinks (i.e., perceived social norms) (*Most people we know think it's okay to have soft drinks; My child's friends think it's ok to have soft drinks*: 5-point scale ranging from never to daily). The instrument was pre-tested with 28 parents during four focus groups to ensure ease of comprehension.

Analysis

Linear regression analyses were conducted to examine predictors of the reported frequency of children's soft drink consumption. Regression analyses were accomplished in two steps. First, separate univariate regression analyses were conducted for each possible predictor to avoid any complications due to multicollinearity. In the second step, significant univariate predictors were included in a simultaneous multivariate regression model to determine the unique